

Claims:

1. A process of removing crystallization inhibitors from a solution comprising one or more reducing sugars and/or corresponding sugar alcohols thereof, characterized in that said solution is subjected to one or more purification steps selected from nanofiltration, hydrolysis and chromatography.

2. A process as claimed in claim 1, characterized in that said reducing sugar is selected from monosaccharides.

3. A process as claimed in claim 2, characterized in that said reducing sugar is selected from xylose.

4. A process as claimed in claim 2, characterized in that said reducing sugar is selected from fructose.

5. A process as claimed in claim 1, characterized in that said reducing sugar is selected from maltose.

6. A process as claimed in any one of claims 1 to 5, characterized in that said crystallization inhibitor is selected from compounds which have a larger molar mass than said reducing sugar or the corresponding sugar alcohol thereof.

7. A process as claimed in claim 6, characterized in that said crystallization inhibitor is selected from compounds which in their molecule include at least one monosaccharide or corresponding unit more than said reducing sugar or the corresponding sugar alcohol thereof.

8. A process as claimed in claim 6 or 7, characterized in that said crystallization inhibitor is selected from dimeric and/or oligomeric compounds.

9. A process as claimed in claim 8, characterized in that said dimeric and/or oligomeric compounds are selected from dimeric and/or oligomeric forms of said reducing sugar and/or the corresponding sugar alcohol thereof.

10. A process as claimed in claim 3, characterized in that said crystallization inhibitor is selected from xylobiose, xylotriose and xylo-oligosaccharides.

11. A process as claimed in claim 4, characterized in that said crystallization inhibitor is selected from difructose anhydrides, fructose dianhydrides, diheterolevosanes and diheterolevulosans.

12. A process as claimed in claim 5, characterized in that said crystallization inhibitor is selected from maltotriose and maltotetraose.

13. A process as claimed in any one of claims 1 to 12, characterized in that said purification step comprises nanofiltration.

14. A process as claimed in claim 13, characterized in that said reducing sugar and/or corresponding sugar alcohol thereof is recovered in the nanofiltration permeate and said crystallization inhibitors are recovered in the nanofiltration retentate.

15. A process as claimed in claim 13, characterized in that the nanofiltration is carried out at a pressure of 10 to 50 bar, preferably 15 to 40 bar.

16. A process as claimed in any one of claims 13 to 15, characterized in that the nanofiltration is carried out at a temperature of 5 to 95 °C, preferably 30 to 60 °C.

17. A process as claimed in any one of claims 13 to 16, characterized in that the nanofiltration is carried out with a flux of 5 to 100 liters/m²h.

18. A process as claimed in any one of claims 13 to 17, characterized in that the nanofiltration is carried out using a nanofiltration membrane selected from polymeric and inorganic membranes having a cut-off size of 100 to 2500 g/mol.

19. A process as claimed in claim 18, characterized in that the cut-off size of the nanofiltration membrane is 150 to 1000 g/mol.

20. A process as claimed in claim 19, characterized in that the cut-off size of the nanofiltration membrane is 150 to 500 g/mol.

21. A process as claimed in any one of claims 18 to 20, characterized in that the nanofiltration membrane is selected from ionic membranes.

22. A process as claimed in any one of claims 18 to 21, characterized in that the nanofiltration membrane is selected from hydrophobic and hydrophilic membranes.

23. A process as claimed in any one of claims 18 to 22, characterized in that the nanofiltration membrane is selected from cellulose acetate membranes, polyethersulfone membranes, sulfonated polyether sulphone membranes, polyester membranes, polysulfone membranes, aromatic polyamide membranes, polyvinyl alcohol membranes and polypiperazine membranes and combinations thereof.

24. A process as claimed in claim 23, characterized in that the nanofiltration membrane is selected from sulfonated polyether sulfone membranes and polypiperazine membranes.

25. A process as claimed in claim 23 or 24, characterized in that the nanofiltration membrane is selected from NF-200, Desal-5 DL, Desal-5 DK, Desal G10 and NTR 7450 membranes.

26. A process as claimed in any one of claims 18 to 25, characterized in that the form of the nanofiltration membrane is selected from sheets, tubes, spiral membranes and hollow fibers.

27. A process as claimed in any one of claims 18 to 26, characterized in that the nanofiltration membrane is selected from high shear type membranes.

28. A process as claimed in any one of claims 18 to 27, characterized in that the nanofiltration membrane has been pretreated by washing.

29. A process as claimed in claim 28, characterized in that the washing agent is selected from ethanol and/or an alkaline detergent.

30. A process as claimed in any one of claims 13 to 29, characterized in that the nanofiltration process is repeated at least once.

31. A process as claimed in any one of claims 13 to 30, characterized in that the process is carried out batchwise or continuously.

32. A process as claimed in any one of claims 13 to 31, characterized in that the process is carried out using a nanofiltration equipment including several nanofiltration elements arranged in parallel or series.

33. A process as claimed in any one of claims 1 to 12, characterized in that said purification step comprises hydrolysis.

34. A process as claimed in claim 33, characterized in that said hydrolysis comprises enzymatic hydrolysis.

35. A process as claimed in claim 33, characterized in that said hydrolysis comprises acid hydrolysis.

36. A process as claimed in any one of claims 1 to 12, characterized in that said purification step comprises chromatographic separation.

37. A process as claimed in claim 36, characterized in that said chromatographic separation is carried out using a column packing material selected from cation exchange resins and anion exchange resins.

38. A process as claimed in claim 37, characterized in that said cation exchange resins are selected from strongly acid cation exchange resins and weakly acid cation exchange resins.

39. A process as claimed in claim 37 or 38, characterized in that said resin is in a monovalent metal form or a divalent metal form.

40. A process as claimed in any one of claims 37 to 39, characterized in that the resin has a styrene skeleton or acrylic skeleton.

41. A process as claimed in claim 40, characterized in that the resin is crosslinked with divinylbenzene.

42. A process as claimed in any one of claims 1 to 41, characterized in that said solution comprising one or more reducing sugars and/or corresponding sugar alcohols thereof is a biomass hydrolysate.

43. A process as claimed in any one of claims 1 to 41, characterized in that said solution comprising one or more reducing sugars and/or corresponding sugar alcohols thereof is a fraction enriched in said reducing sugar and/or sugar alcohol and obtained from the separation of said reducing sugar and/or sugar alcohol.

44. A process as claimed in claim 43, characterized in that said solution comprising one or more reducing sugars and/or sugar alcohols thereof is obtained from the chromatographic separation of said reducing sugar and/or sugar alcohol.

45. A process as claimed in any one claims 1 to 41, characterized in that said solution comprising one or more reducing sugars and/or corresponding sugar alcohols thereof is a mother liquor obtained from the crystallization of said reducing sugar and/or sugar alcohol.

46. A process as claimed in claim 3, characterized in that said solution comprising xylose is a spent liquor obtained from a pulping process.

47. A process as claimed in claim 3, characterized in that said solution comprising xylose is a xylose fraction obtained from the chromatographic separation of xylose from a spent liquor obtained from a pulping process.

48. A process as claimed in claim 3, characterized in that said solution comprising xylose is a mother liquor obtained from the crystallization of xylose.

49. A process as claimed in claim 4, characterized in that said solution comprising fructose is a fructose solution obtained from the hydrolysis of starch.

50. A process as claimed in claim 4, characterized in that said solution comprising fructose is a fructose solution obtained from the isomerization of saccharose.

51. A process as claimed in claim 4, characterized in that said solution comprising fructose is a fructose fraction obtained from the separation of fructose from a fructose solution obtained from the isomerization of saccharose.

ration of fructose from a fructose solution obtained from the hydrolysis of starch and/or isomerisation of saccharose.

52. A process as claimed in claim 51, c h a r a c t e r i z e d in that said solution comprising fructose is a fructose fraction obtained from the chromatographic separation of fructose from a solution obtained from the hydrolysis of starch and/or isomerisation of saccharose.

53. A process as claimed in claim 4, c h a r a c t e r i z e d in that said solution comprising fructose is a mother liquor obtained from the crystallization of fructose.